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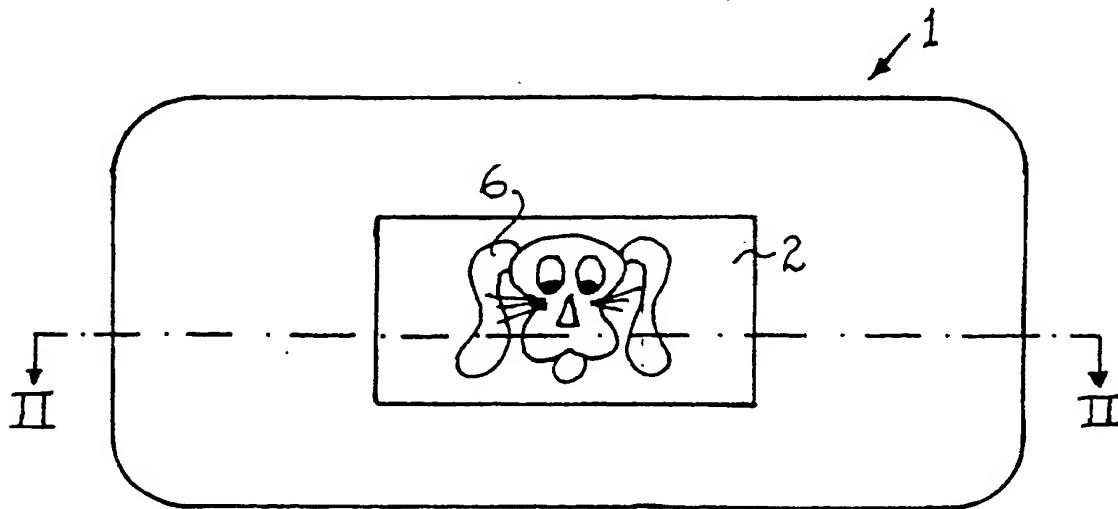
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④ Cake of soap.

⑤ A cake of soap (1) has display means (2) adhered to or embedded therein. The display means (2) includes at least one deposit of temperature responsive liquid crystal material which undergoes a reversible visible colour change when passing through a predetermined temperature of from 25 °C

to 45 °C. The display means is intended to change its display when moving between water at a temperature above, and ambient air at a temperature below, said predetermined temperature.

### FIG. 1



## CAKE OF SOAP

This invention relates to a cake of soap having display means embedded therein, in particular, but not exclusively, the invention is intended to relate to cakes of soap for the use of babies or children.

Young children, and in particular boys, are reputed to have an aversion to the use of soap when taking baths. In order to overcome this aversion, soap manufacturers have attempted to make cakes of soap more appealing for children to use. For example, it is known to mould the cakes into special shapes, e.g. into the shape of cartoon characters or the like, which may also be multicoloured.

It is also known with more expensive cakes of soap not intended specifically for the children's market, to embed in, or adhere to, the soap display cards or films displaying, for example, the trade name of the soaps in question. Such display cards or films remain attached to the soap even after the cake has been repeatedly used.

An aim of the present invention is to provide a cake of soap having a novel form of display means adhered to, or embedded in, the soap which changes its display when heated, e.g. by being immersed in water, in excess of a predetermined temperature.

According to the present invention a cake of soap having display means adhered to, or embedded in, the cake, is characterised in that the display means includes at least one deposit of temperature responsive liquid crystal material which undergoes a reversible visible colour change when passing through a predetermined temperature of from 25 °C to 45 °C, the said deposit(s) being surrounded by at least substantially water-impermeable covering means.

The or each deposit of liquid crystal material is intended to undergo a reversible visible colour change when the cake of soap is either dipped into, or removed from, bath water at typical bath water temperature.

Various types of temperature responsive liquid crystal material well known to persons skilled in the art may be used for the display means. Preferably, however, the temperature responsive liquid crystal material is thermochromic, displaying so-called "colour play" (i.e. a reversible change of colour through a range of colours) over a predetermined temperature range and appearing opaque, e.g. black, at temperatures above and below the predetermined temperature range. In this case the lowest temperature that the liquid crystal material displays colour play will be the said predetermined temperature. By way of example, the colour play temperature range may typically be from 32 °C to 45 °C, preferably from 35 °C to 42 °C (i.e. a typical

range of bath water temperatures) so that different colours are displayed for different temperatures within the colour play temperature range. Alternatively, but less preferably, the liquid crystal material may be of the type which is normally opaque, e.g. green when backed with a black backing, at temperatures immediately below said predetermined temperature but which clears at said predetermined temperature (i.e. the "clearing point") and remains transparent at temperatures immediately in excess of the predetermined temperature. In this case a representation behind the or each deposit of liquid crystal material will become visible as the liquid crystal material is heated from a temperature below, to a temperature in excess of, its clearing point. Ideally in this case the said predetermined temperature is chosen to be above normal bathroom air temperature and below the water temperature used for a normal bath and typically will be in the range from 28 °C to 38 °C, for example 33 °C.

The display means may serve to display the water temperature of the bath, e.g. by thermochromic liquid crystal material displaying a different colour in dependence on the water temperature. Preferably, however, the display means is intended to display a picture, e.g. of a cartoon character or the like, and/or a product name on colour change of the temperature responsive liquid crystal material. If the liquid crystal material is of the type which clears when its temperature passes through the clearing point, the picture and/or product name is arranged to become visible through the transparent liquid crystal material when the latter is at a temperature above the clearing point (i.e. when the cake of soap is immersed in bath water at a temperature above the clearing point) and to become invisible when the liquid crystal material becomes opaque (i.e. when the cake of soap is removed from the bath water into air temperature below the clearing point). If the liquid crystal material is thermochromic, displaying colour play over a predetermined colour range, the or each deposit of temperature responsive liquid crystal material is conveniently arranged in a pattern representative of the picture and/or product name to be displayed.

The display means is conveniently adhered to the cake of soap with a suitable adhesive, e.g. an insoluble medically inert adhesive, so that a display surface is visible when the cake is unused. Less preferably, however, the display means may be completely embedded in the cake of soap so that a display surface becomes revealed only after some of the soap material has been dissolved from the cake.

The display means may conveniently comprise a thin, e.g. 500  $\mu\text{m}$ , laminated display device having upper and lower surfaces provided by at least substantially water impermeable material, typically, for example, outer sheets of plastics material.

Preferably the liquid crystal material is printed onto a carrier sheet, e.g. an inner surface of one of said water impermeable outer sheets.

The display means may include printed display matter visible whether or not the cake of soap is out of, or immersed in, bath water in excess of said predetermined temperature.

An embodiment of the invention will now be described, by way of example, with particular reference to the accompanying drawing, in which

Figure 1 is a plan of a cake of soap according to the invention, and

Figure 2 is a sectional view taken on the line II-II of Figure 1.

Figures 1 and 2 show a cake of soap generally designated by the reference numeral 1, having a rectangular recess in its top surface in which is embedded a rectangular laminated display device 2.

The display device 2 comprises an upper transparent sheet 4 of water impermeable plastics material laminated to a lower sheet 5 of water impermeable plastics material. The inner surface of the sheet 4 has printed, e.g. screen printed, thereon at least one deposit of temperature responsive thermochromic liquid crystal material in the form of a design 6 and, completely underlying the design 6 when viewed from above, a black backing layer (not shown). The printing "ink" typically comprises microencapsulated droplets of the liquid crystal material. The sheets 4 and 5 are typically gloss or matt surfaced PVC which is surface modified to enable specially developed ink systems to key directly onto the modified surface during printing. Typically the sheets 4 and 5 have a thickness of 240  $\mu\text{m}$  each and the display device has a thickness of about 500  $\mu\text{m}$ . The temperature responsive liquid crystal material is chosen to have a colour play over a temperature range of from 32  $^{\circ}\text{C}$  to 45  $^{\circ}\text{C}$ , and preferably from 35  $^{\circ}\text{C}$  to 42  $^{\circ}\text{C}$ . Outside this temperature range the liquid crystal material will normally have a black appearance. The design 6 is only visible from above when the overlying liquid crystal material displays colour play (i.e. when at a temperature within the colour play temperature range). Other printed matter (not shown) may be arranged so as to be visible at all times.

In use, when the cake 1 of soap is immersed in bath water of normal bath water temperature, e.g. 39  $^{\circ}\text{C}$ , which falls within the colour play temperature range, the liquid crystal material will display a colour characteristic of that bath water temperature and the design 6 will be visible from above. On

taking the cake of soap out of the bath water, the temperature of the liquid crystal material quickly falls below the colour play temperature range so that the liquid crystal material becomes black and merges with the black backing so that the outline of the design 6 cannot be seen. The cake 1 of soap is particularly appealing to children and encourages them to use soap when taking a bath. As with conventional cakes of soap having conventional display cards embedded therein, the display device 2 will remain adhered to, or embedded in, the cake 1 of soap as the cake becomes smaller in size during use of the soap. By sandwiching the liquid crystal material between at least substantially water impermeable sheets 4 and 5, the liquid crystal material is protected from being contacted by bath water when the cake of soap is immersed therein. The adhesive(s) for laminating the sheets 4 and 5 together and adhering the display device 2 to the cake 1 should not of course be water soluble.

The invention may be modified in many ways. For example more than one region or deposit of liquid crystal material may be provided in the display means. The liquid crystal material design and black backing layer may be printed on the lower sheet 5 instead of the upper sheet 4. Alternatively the lower sheet 5 may be dispensed with if, for example, a water resistant backing ink, e.g. black backing ink, is employed to provide a complete backing for the display device. This enables a thinner, e.g. 250  $\mu\text{m}$ , display device to be employed. Instead of the temperature responsive liquid crystal material being thermochromic and displaying colour play over a colour play temperature range, the liquid crystal material could be of the type which appears opaque, e.g. green, at temperatures below a specific clearing temperature (the so-called "clearing point") and which is transparent at temperatures above the clearing point. With such liquid crystal material, a specific design of liquid crystal material could be printed so as to overlie a similar design in a preferably dark, e.g. black, backing ink. A green surrounding ink, similar in colour to the opaque liquid crystal material, could be printed around, so as to blend in with, the design. On clearing of the liquid crystal material, the dark backing ink would be visible against the surrounding green ink. Alternatively the surrounding ink could be matched to the colour of the backing ink so that the design would "disappear" on clearing of the liquid crystal material. With such liquid crystal material the clearing point of the liquid crystal material is chosen to be above the typical ambient air temperature in a bathroom when a person takes a bath but below the minimum bath water temperature that a person would normally expect to experience. For example the clearing

point would normally be between 25 °C to 45 °C and preferably between 28 °C to 38 °C. A typical clearing point temperature would be 33 °C. Instead of displaying a specific design 6 in the form, for example, of a cartoon character, other information, such as a product name, may be displayed. It is even possible to arrange for the display device to be a thermometer displaying bath water temperature when the soap is immersed in the bath water.

### Claims

1. A cake of soap (1) having display means (2) attached thereto, characterised in that the display means (2) includes at least one deposit of temperature responsive liquid crystal material which undergoes a reversible visible colour change when passing through a predetermined temperature of from 25 °C to 45 °C, the said deposit(s) being surrounded by at least substantially water-impermeable covering means (4, 5).
2. A cake of soap according to claim 1, characterised in that said at least one deposit of liquid crystal material is intended to undergo a reversible visible colour change when the cake of soap is either dipped into, or removed from, bath water at typical bath water temperature.
3. A cake of soap according to claim 1 or 2, characterised in that the temperature responsive liquid crystal material is thermochromic, displaying a reversible change of colour through a range of colours over a predetermined temperature range and appearing opaque at temperatures above and below the predetermined temperature range.
4. A cake of soap according to claim 3, characterised in that the said predetermined temperature range is from 32 °C to 45 °C so that different colours are displayed for different temperatures within the colour play temperature range.
5. A cake of soap according to claim 1 or 2, characterised in that the liquid crystal material is of the type which is normally opaque at temperatures immediately below said predetermined temperature but which clears at said predetermined temperature and remains transparent at temperatures immediately in excess of the predetermined temperature.
6. A cake of soap according to claim 5, characterised in that the said predetermined temperature is chosen to be in the range from 28 °C to 38 °C.
7. A cake of soap according to any of the preceding claims, characterised in that the display means is adhered to the cake of soap with a suitable adhesive so that a display surface is visible when the cake is unused.
8. A cake of soap according to any of claims 1 to 6, characterised in that the display means is com-

pletely embedded in the cake of soap so that a display surface becomes revealed only after some of the soap material has been dissolved from the cake.

5. 9. A cake of soap according to any of the preceding claims, characterised in that the display means comprises a thin, laminated display device having upper (4) and lower (5) surfaces provided by at least substantially water impermeable material.
10. 10. A cake of soap according to any of the preceding claims characterised in that the liquid crystal material is printed onto a carrier sheet.
11. 11. A cake of soap according to any of the preceding claims, characterised in that the display means includes a display which differs in dependence on whether the liquid crystal material is above or below the said predetermined temperature.

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FIG. 1

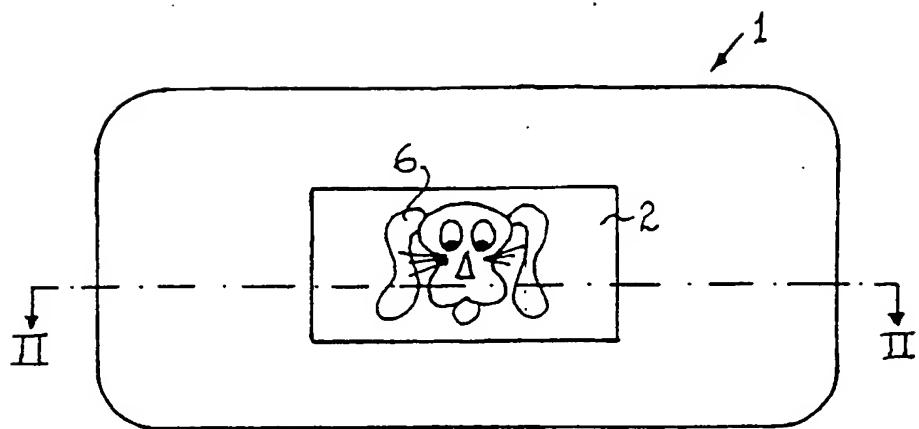
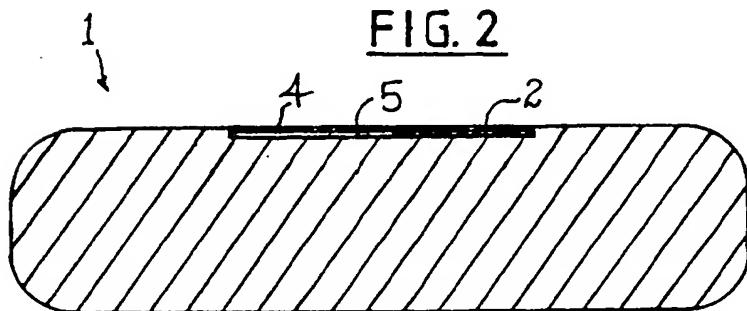


FIG. 2



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## EUROPEAN PATENT APPLICATION

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㉑ Applicant: MAGNAPOWER GROUP LIMITED  
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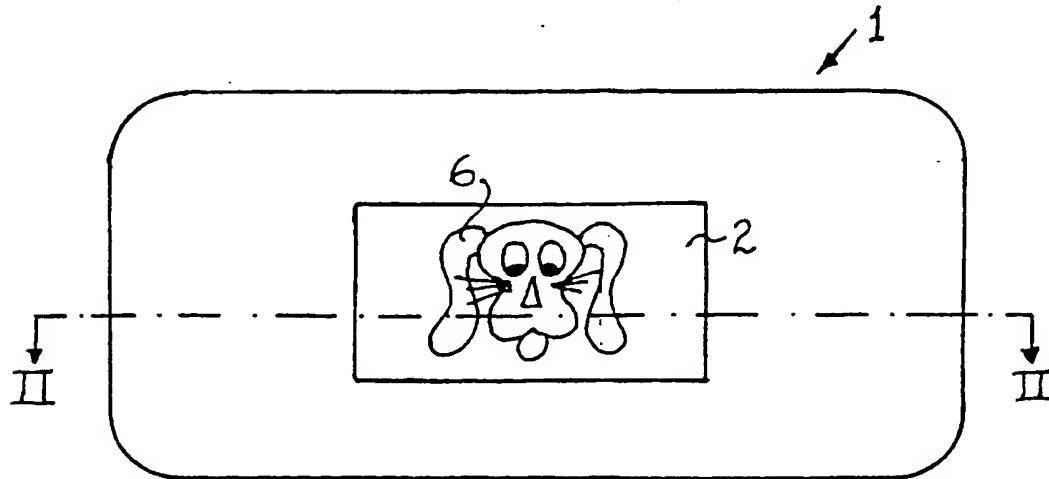
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11.09.91 Bulletin 91/37

㉗ Cake of soap.

㉘ A cake of soap (1) has display means (2) adhered to or embedded therein. The display means (2) includes at least one deposit of temperature responsive liquid crystal material which undergoes a reversible visible colour change when passing

through a predetermined temperature of from 25 °C to 45 °C. The display means is intended to change its display when moving between water at a temperature above, and ambient air at a temperature below, said predetermined temperature.

### FIG. 1



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EUROPEAN SEARCH  
REPORT

EP 90 30 9971

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	CH-A-6 202 95 (S.P.A. CELLOGRAF SIMP) * whole document -----	1-7,9-11	C 11 D 17/04 G 01 K 11/16 C 11 D 9/00
Y	FR-A-1 465 883 (M.A. VON GESZTEREDY) * whole document -----	1-7,9-11	
Y	CH-A-6 253 59 (I.P.S. INTERNATIONAL PRODUCTS) * whole document -----	1-5,8-11	
P,Y	FR-A-2 648 824 (SOUIMDEDOUGE- LAMALESS) * whole document -----	1-5,8-11	
A	GB-A-1 439 244 (PROCTER & GAMBLE) * claims -----	1	
A	US-A-4 738 549 (R. GREGORY PLIMPTON) -----	1-6,9	
A	EXPERIMENTS IN FLUIDS vol. 2, no. 2, 1984, pages 65,66, Berlin, DE; T.R. OGDEN et al.: "Liquid crystal thermography in water tunnels" * whole document -----	1	
A,P	PATENT ABSTRACTS OF JAPAN, DATABASE JAPS/JPO vol. 135, no. 89 (C-670), 25 December 1989; & JP - A - 1246209 (MIKIMOTO SEIYAKU K.K.) 02.10.1989 * abstract -----	1	C 11 D G 01 K

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
Berlin	27 June 91	PELLI-WABLAT B
<b>CATEGORY OF CITED DOCUMENTS</b>		
X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention	E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document	